Condom Breakage and Slippage during Heterosexual Intercourse: A French National Survey

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ABSTRACT

Objectives. This study examined condom failure rates in a representative sample of French men and women.

Methods. Condom users who experienced breakage or slippage were compared with those who reported no difficulties.

Results. The rate of breakage at last heterosexual intercourse was 3.4%, and the slippage rate was 1.1%. Significantly associated with breakage and slippage were being age 25 through 34, being sexually active for more than 5 years, condom use for less than 5 years, condom not used for contraception, and sexual intercourse 12 or more times per month.

Conclusions. People who became sexually active before the era of acquired immunodeficiency syndrome, who began condom use in recent years, and who have frequent sex are at increased risk. The low risk observed among experienced condom users below age 25 supports condom promotion to youth. (*Am J Public Health.* 1997;87:421–424)

Introduction

The effectiveness of condoms in preventing transmission of the human immunodeficiency virus (HIV) and other sexually transmitted diseases can be measured via a number of approaches.[1–4] Among them, the analysis of in vivo condom failure has received insufficient attention. Available studies are generally based on purposive nonrandom samples.[5–30] Possibilities for generalization are therefore limited as a result of selection bias. To our knowledge, only one study was based on a random sample, and that study was limited to men 20 to 39 years of age.[31]

The recent French survey of sexual behavior[32,33] provided an opportunity to conduct an analysis of condom failure in a national random sample representative of a population of men and women 18 to 69 years old. Failure rates were examined regarding sociodemographic and behavioral characteristics to identify subsets of the population at risk of failure, and characteristics of sexual intercourse were analyzed to assess the circumstances of failure.

Methods

The French survey on sexual behavior is a large-scale, random-sample telephone survey. Its methodology and sample characteristics have been described elsewhere.[32–34] A random sample of 20 055 subjects was used to draw a subsample of 4820 individuals (2642 men and 2178 women) interviewed between September 1991 and February 1992. The 4463 subjects (93%) who were sexually active during the previous year were interviewed in detail about their last sexual intercourse. Of these individuals, 731 had used a condom for heterosexual intercourse, and 707 (97%) provided information on possible difficulties in use. In terms of difficulties, the precise wording of options was as follows: "none" (n = 655); "torn, burst" (breakage; n = 27); "slipped down, disappeared" (slippage; n = 13); and "other problems" (n = 12). This paper compares users who experienced breakage or slippage with those who declared no difficulty. Because of the complex sample design,[35–39] SUDAAN software[40] was used in conducting analyses.

Results

The rate of condom breakage at last intercourse was 3.4%, and the rate of slippage was 1.1% (Table 1). Univariate analyses indicated that the following factors were associated ($P < .1$) with slippage or breakage (i.e., overall "technical failure"): age 25 to 34 years, being sexually active for more than 5 years, condom use for less than 5 years, no condom use for contraception, multiple partners during the last year, and high frequency of sexual intercourse (≥12/month). When entered simultaneously in a logistic regression model (Table 2), these variables, except for multiple partnership ($P = .087$), were significantly associated with failure ($P < .05$). High frequency of intercourse was associated with breakage but not with slippage; in contrast, the other significant factors showed similar trends in their association with either breakage or slippage (Table 1).

Discussion

Self-reports of recent condom failure are believed to be reliable,[13,15] as are reports of recent sexual events in gen-

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eral.[41] Because it was based on a large random sample, this study has both advantages and limitations. Neither condom use[32] nor condom failure is frequent in the general population; as a result, our analysis was based on small numbers and lacked statistical power. This also prevented detailed statistical analysis (e.g., by gender or type of failure). Our definition of failure included both breakage and slippage. Admittedly, this combined measure groups together incidents of a different nature, but the purpose of this type of study was to identify subgroups of individuals requiring greater attention in the general population rather than to identify the detailed mechanisms leading to breakage and slippage. In addition, most factors that tended to be associated with breakage also tended to be associated with slippage.

In previous research, rates and factors associated with condom failure have varied from one study to another. Variations may stem from a number of sources: population samples, definition of failure,[42] measures adopted, and quality of product.[3] The rates of breakage and slippage obtained here are broadly similar to those observed elsewhere. Although these rates were considerably less influenced by population bias than was the case in previously published data, they nonetheless remained representative of the general population in a country where condoms are of high quality, since by law each batch is quality tested by an independent organization before distribution. On the other hand, a wide definition of failure was used in this study; some of the incidents of breakage and slippage may not have entailed clinical risk[42] (e.g., breakage when the condom was being put on). The rate of events leading to possible HIV transmission was therefore less than 4.5%.

Experience of condom difficulties may be related to various factors, the chances of successful use being the result of a complex interaction between user and product.[3] In this study, we were able to examine only a limited range of factors. Unlike the case in certain other studies,[7,10,20,31] no significant associations were found with characteristics of the coital act. This may have been attributable to a lack of statistical power, or the two events we analyzed may have involved very different mechanisms. Failure at last intercourse was more likely to occur in those having frequent intercourse, but the higher rate observed in respondents with multiple partners, also observed in other

TABLE 1— Rate of Condom Failure at Last Heterosexual Intercourse

	Breakage, % (95% CI)	Slippage, % (95% CI)	Overall, % (95% CI)	P[a]
Total sample	3.4 (1.5, 5.3)	1.1 (0.3, 2.0)	4.5 (2.4, 6.6)	
Sociodemographic and behavioral characteristics				
Gender				
Men	2.3 (0.7, 3.9)	1.0 (0.0, 2.0)	3.2 (1.4, 5.1)	.187
Women	5.2 (0.9, 9.5)	1.5 (0.0, 3.0)	6.5 (2.1, 11.0)	
Age, y				
18–24	2.5 (0.6, 4.5)	0.3 (0.0, 0.5)	2.8 (0.8, 4.7)	.076
25–34	8.3 (1.2–15.5)	3.9 (0.1, 7.8)	11.7 (4.1, 19.2)	
35–69	1.5 (0.0, 3.2)	0.6 (0.0, 1.2)	2.0 (0.2, 3.8)	
Education				
Less than high school	3.8 (0.9, 6.7)	0.7 (0.0, 1.5)	4.4 (1.5, 7.4)	.926
High school or more	2.6 (0.7, 4.6)	1.7 (0.0, 3.5)	4.3 (1.7, 6.8)	
Current or last occupation				
Upper-middle-class job	2.8 (0.0, 7.0)	1.7 (0.0, 4.5)	4.3 (0.0, 9.3)	.277
Middle-class job	4.8 (0.6, 8.9)	1.6 (0.0, 3.1)	6.2 (1.8, 10.5)	
Blue-collar or farm work	3.3 (0.0, 6.6)	1.2 (0.0, 3.4)	4.5 (0.6, 8.4)	
Never employed	1.8 (0.1, 3.6)	0.1 (0.0, 0.3)	2.0 (0.2, 3.7)	
Residence				
Provincial town: ≤100 000 inhabitants	3.3 (0.1, 6.4)	1.2 (0.0, 2.5)	4.4 (1.1, 7.7)	.994
>100 000 inhabitants	3.8 (0.9, 6.6)	1.0 (0.0, 2.5)	4.7 (1.5, 7.8)	
Paris area	3.2 (0.4, 6.0)	1.3 (0.0, 2.8)	4.5 (1.3, 7.6)	
Living as couple				
Yes	4.3 (0.6, 8.0)	1.5 (0.0, 3.2)	5.7 (1.7, 9.6)	.324
No	2.6 (1.0, 4.2)	0.9 (0.2, 1.6)	3.5 (1.7, 5.2)	
Household monthly income, US$				
<1600	5.6 (0.8, 10.4)	2.0 (0.0, 4.0)	7.3 (2.3, 12.4)	.145
≥1600	2.4 (0.8, 4.1)	0.8 (0.0, 1.7)	3.2 (1.4, 5.1)	
Years of sexual experience				
0–4	1.5 (0.1, 3.0)	0.2 (0.0, 0.5)	1.7 (0.2, 3.2)	.037
5–14	5.2 (1.8, 8.5)	2.5 (0.0, 5.2)	7.5 (3.4, 11.6)	
≥15	3.4 (0.0, 7.2)	0.8 (0.0, 1.6)	4.2 (0.3, 8.0)	
Years of condom use				
<5	6.2 (2.2, 10.1)	1.8 (0.1, 3.6)	7.8 (3.6, 12.0)	.006
≥5	0.8 (0.2, 1.3)	0.7 (0.0, 1.4)	1.4 (0.5, 2.3)	
Condom use for contraception				
Yes	4.7 (1.5, 7.9)	1.5 (0.1, 2.9)	2.5 (0.9, 4.0)	.069
No	1.7 (0.4, 3.0)	0.8 (0.0, 1.6)	6.0 (2.6, 9.4)	
No. sexual partners during the last year				
1	2.9 (0.7, 5.2)	0.8 (0.0, 1.8)	3.7 (1.3, 6.1)	.058
≥2	5.3 (2.5, 8.2)	2.7 (0.7, 4.6)	7.7 (4.5, 11.0)	
Frequency of sexual intercourse during the last month				
≤12	1.8 (0.7, 2.9)	1.2 (0.3, 2.2)	3.0 (1.5, 4.5)	.073
>12	13.1 (2.2, 24.0)	0.7 (0.0, 1.7)	13.6 (2.7, 24.5)	
Characteristics of last intercourse				
Sexual practices[b]				
Vaginal sex only	6.9 (0.0, 15.2)	0.0 . . .[c]	4.4 (2.2, 6.5)	.563
Vaginal and anal sex	3.3 (1.3, 5.3)	1.2 (0.3, 2.2)	6.9 (0.0, 15.2)	
Duration of intercourse, h				
<0.5	3.6 (0.7, 6.5)	1.3 (0.0, 2.7)	4.8 (1.7, 8.0)	.502
≥0.5	2.7 (0.8, 4.5)	0.9 (0.0, 1.9)	3.6 (1.5, 5.6)	

(Continued)

TABLE 1—*Continued*

	Breakage, % (95% CI)	Slippage, % (95% CI)	Overall, % (95% CI)	*P*[a]
Delay between last intercourse and interview, d				
0–14	3.6 (1.0, 6.2)	1.5 (0.2, 2.7)	5.0 (2.2, 7.8)	.538
15–30	4.0 (0.0, 8.7)	0.4 (0.0, 1.2)	4.4 (0.0, 9.1)	
≥31	2.3 (0.0, 4.5)	0.6 (0.0, 1.7)	2.8 (0.3, 5.3)	
Characteristics of partner				
Main and cohabiting	4.3 (0.4, 8.2)	1.6 (0.0, 3.4)	5.7 (1.5, 9.9)	.163
Main, not cohabiting	1.5 (0.3, 2.8)	1.1 (0.2, 2.0)	2.6 (1.0, 4.1)	
Casual	7.0 (1.4, 12.6)	0.0 . . .[c]	7.0 (1.4, 12.6)	
Duration of relationship with partner, y				
≤1.5	3.3 (1.0, 5.5)	0.5 (0.0, 1.0)	3.8 (1.5, 6.0)	.545
>1.5	3.5 (0.7, 6.2)	1.5 (0.2, 2.9)	4.9 (1.9, 7.9)	

Note. CI = confidence interval.
[a]Significance level for overall failure.
[b]One subject who had anal sex only and experienced no failure is excluded from this computation.
[c]Not computable.

TABLE 2—Factors Associated with Condom Failure (Breakage or Slippage): Adjusted Odds Ratios

	OR (95% CI)	*P*
Age, y		
18–24	1.5 (0.2, 9.2)	.017
25–34	5.1 (1.2, 21.7)	
35–69	1.0 . . .[a]	
Years of sexual experience		
0–4	1.0 . . .[a]	.036
5–14	2.0 (1.0, 16.3)	
≥15	2.5 (1.7, 66.8)	
Years of condom use		
<5	14.7 (4.9, 44.0)	.000
≥5	1.0 . . .[a]	
Condom use for contraception		
No	2.6 (1.0, 6.8)	.050
Yes	1.0 . . .[a]	
No. sexual partners during the last year		
≥2	2.2 (0.9, 5.2)	.087
1	1.0 . . .[a]	
Frequency of sexual intercourse during the last month		
≥12	4.5 (1.9, 10.8)	.001
<12	1.0 . . .[a]	

Note. The logistic regression model included all variables significant at $P < .1$ in the univariate analysis. OR = odds ratio; CI = confidence interval.
[a]Category of reference.

studies,[5,7,13,31] did not reach significance in our multivariate analysis. Our study also did not show any trends regarding the characteristics of the relationship. In terms of sociodemographic characteristics, the higher incidence of problems in low income and education groups observed in previous studies[18,20,31] was not evident in our analysis. One factor that appears consistent across several studies, however, is length of experience in terms of condom use; we found, as have others, that low failure rate was correlated with greater experience.[7,8,13,20,31] In contrast, an opposite association was found with length of sexual experience; people who had recently begun sexual activity and who had started condom use early appeared to be at lower risk. Our findings regarding the importance of age are of interest. Users 25 to 34 years of age were more likely to report difficulties than younger or older users, in spite of potential collinearity between age and sexual experience. This suggests that a generation effect is at play, those starting their sexual life during the contraceptive pill era, before the major impact of AIDS prevention activities on condom use in France,[43] being at greater risk. Findings regarding whether the condom was being used for contraception further suggest that the habit of using condoms reduces the likelihood of failure.

Although failure is infrequent across the general population, it may become common in subgroups accumulating several risk factors, as suggested by the odds ratios of our logistic regression. For example, the failure rate reached 24.1% (95% confidence interval [CI] = 7.0, 41.3) among people 25 to 34 years old with less than 5 years of condom use (the small sample size prevented us from computing rates for all variable combinations). In contrast, the rate of 0.7% (95% CI = 0.0, 2.0) among people 18 to 24 years old with more than 5 years of condom use is encouraging and provides supportive evidence for the appropriateness of condom promotion policies for youth. □

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